CyberAula 2.0: Integration of Moodle with videoconferencing and lecture recording services

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Abstract: This paper describes the CyberAula 2.0 project which presents an integrated solution for videoconferencing and lecture recording as a mechanism to support subjects which need to be promoted or discontinued within the framework of the European convergence process. Our solution is made up of a web portal, a videoconferencing tool and an economical and easily transportable hardware kit. Recording sessions can be exported to SCORM and LOM compliant files which can be imported by an LMS. The validation process is currently being carried out in five scenarios at our university that use Moodle as a way to deliver content to students.

Introduction

The implementation of the Bologna Process (1999) has brought about a complete restructuring of traditional education in order to adapt its goals and methodologies of the European Higher Education Area (EHEA). Some subjects at our university are in the process of expiring but they need to be supported for students enrolled under the old curricula. Other subjects like English need to be promoted in light of the fact that students need to improve and achieve a working level of this language.

With the aim of participating in this process of European convergence and supporting the teaching of these kinds of subjects, we have developed an integrated solution of videoconferencing and recording lectures which includes a web portal, a videoconferencing tool and an economical and easily transportable hardware kit. All the software used in the project is open source. The videoconferencing tool that we have used is called

Isabel and the web platform to schedule, perform, stream, record and publish the videoconferences automatically is called GlobalPlaza. Both of them have been developed at UPM (Universidad Politécnica de Madrid) and are specifically designed for educational purposes. Each class session is broadcasted on the Internet and recorded, enabling geographically distant students to participate live in on-campus classes with questions through a chat tool or through the same videoconference. In order to provide educational support to GlobalPlaza, the CyberAula 2.0 project has been proposed. Its main objective is to record lectures and export them to LOM (IEEE, 2000) and SCORM (2009) compliant files which can be imported by an LMS such as Moodle.

Five scenarios located in different campuses at our university have been proposed to validate the CyberAula 2.0 project. These scenarios combine classroom education with e-learning technology - Blended Learning (Bielawski & Metcalf , 2003) which provides a large degree of flexibility to the teachers for course design. With the support of technology, the teachers are able to deliver the course materials in multiple channels. This approach not only promotes active learning, but also challenges the students to take control of their own learning.

Problem and motivation

Curriculum restructuring is being carried out at our university as part of the Bologna process implementation. Some courses are in the process of expiring with the introduction of new curricula within the framework of the EHEA. However, they need to be supported for those students enrolled under the old curricula who do not pass this year´s exam.

The delivery of some courses has been moved to a new model from 2009, in order to adapt it for the new ECTS credit system (2009). The subjects under study in this research have an ECTS credit planning and have been organized by generic and specific competences that should be reached through different activities such as lecture classes, classroom practices, laboratory practices and personal study tasks using the UPM Moodle platform. Furthermore, all students at our university have to demonstrate a previous advanced English level to access the English courses as part of the degree, so our university has introduced an English basic and medium course to help these students to improve and achieve the desired level.

The most important motivational aspect behind this project has been the challenge to offer usable educational services of videoconferencing and recording lectures in order to make the education more interesting and more attractive for the students, as well for the teachers, by applying innovative educational methods that make students more creative and responsible, letting them participate in the class in a different and friendly way. Our goal is to allow any teacher or student to manage the videoconferencing and recording services easily.

Video learning is important for distance learning instruction in that most online courses still use primarily text-based materials to deliver instruction, and multimedia can add interactivity to these text-based materials. Video can take tacit information or knowledge that may be too difficult to describe in text into an articulate, vivid description through the use of images. Furthermore, videos have visual appeal that can evoke emotional reactions from students that would help in increasing motivation. With these benefits in mind, streaming video is a new opportunity for educators to bring online courses alive. With streamed videos, students can access the material asynchronously and independent of their location. Streaming media provides opportunities for conventional learning resources to integrate with new computer-based learning tools and approaches (Shephard, 2003).

Project description

The main objective of the CyberAula 2.0 project is to support, record and validate videoconferencing and lecture recording services by means the integration of the UPM Moodle Platform with both the Global Plaza platform and Isabel videoconference tool. Each class session is broadcast on the Internet and then recorded, enabling geographically distant students to participate in on-campus classes.

GlobalPlaza (Barra et al., 2010) is the web platform to schedule, perform, stream, record and publish videoconferences automatically. It is integrated with the videoconferencing tool called Isabel (Quemada et al,

2005), which is a real-time collaboration tool for the Internet, which supports advanced collaborative web/videoconferencing with application sharing and TV like media integration. Both of them are open source solutions which have been developed at our university. GlobalPlaza is a web application developed in the context of the GLOBAL project, a research project supported by the European Commission's seventh framework program. Recording sessions can be exported to LOM and SCORM compliant files which can be imported by an LMS such as Moodle. Students can review the recording lectures when needed through Moodle. Figure 1 shows the architecture of CyberAula 2.0 project.

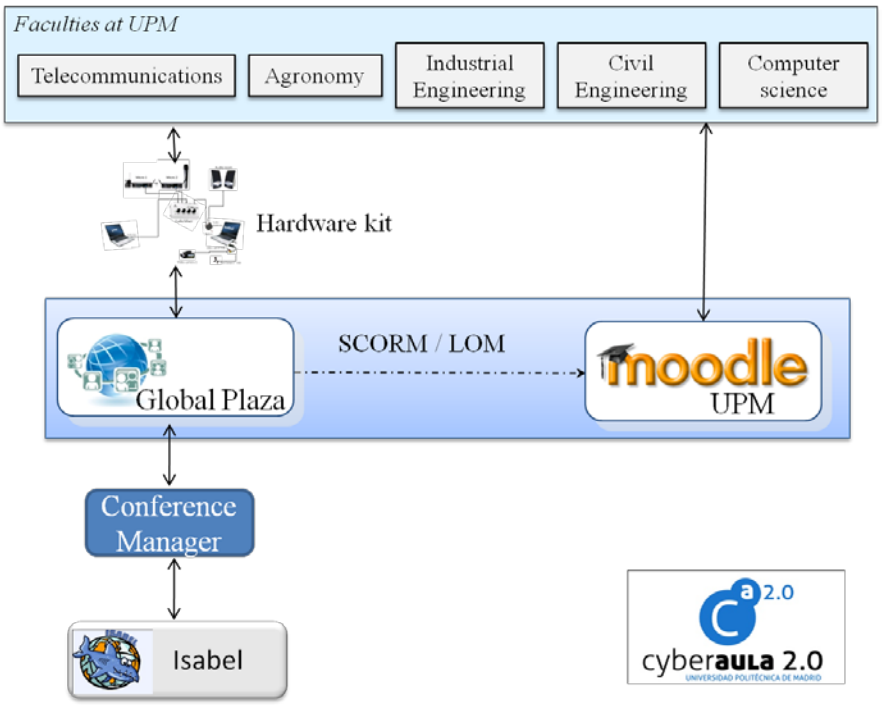

Figure 1. CyberAula architecture overview

An economical and easily transportable hardware kit has been proposed to carry out these videoconferences just with the help of an Internet connection and a power supply. The hardware kit is made up of one laptop with Isabel installed, 2 wireless microphones and receivers (one for the teacher and one for the students), a camera and a tripod.

The managing student of each faculty will need to create an event in GlobalPlaza for the specific time during the course and at that time, start all the hardware, connect the Isabel running on the laptop to the session, test the audio and video and operate the camera during the course.

Scenarios

Five pilot scenarios (Table 1) located in different campuses at our university have been proposed to validate the CyberAula project. The main features of these scenarios are presented below.

ID	Subject	School/Faculty
1	English Courses	Industrial Engineering
2	Digital Systems	Computer Sciences
3	Web 2.0	Telecommunications
4	Structure of Materials 2.0	Materials and Civil Engineering
5	Plants of Agro-alimentary Interest	Agronomics Engineering

Table 1. CyberAula 2.0 scenarios

English Courses: In order to satisfy the requirements in the Bologna Declaration, the governing body of UPM agreed that every degree taught in this university should include a compulsory subject, English for Academic and Professional Communication, with six ECTS.

When students first start university - and according to the levels established by the Spanish Ministry of Education - they should come with a B1 level in English, after the Common European Framework of Reference for Languages (Council of Europe, 2001). However, when students have to take the compulsory subject (English for Academic and Professional Communication) they are required to have a B2 level in English. This requirement is essential to satisfy the goals of the compulsory subject. And this is how we found ourselves in a complicated situation, and found there was a real gap: most of our students entered university with a B1, and they needed to have a B2 to be able to register for the compulsory subject.

UPM has faced this situation as a challenge, and aims to meet it by adopting the following measures:

a) Teaching traditional English courses to acquire the B2 in all its campuses.

b) Recording an English course, as a part of the CyberAula 2.0 project, to be emitted online.

With regard to the latter, we have already started to record the lessons. The project is presently in an experimental phase. Recorded lessons are being analyzed to rectify both technical and teaching mistakes. We have planned to launch this program in the next academic year 2011-12. We are convinced this learning resource will make individual study easier, and will encourage students to join face-to-face lessons as well as other activities to improve their level of English.

Digital Systems: Digital Systems is a required semiannual course (6 ECTS) during the first year of the degree in Computer Engineering. This course takes place during the first and the second semester.

In the Digital Systems course, the program addresses several complex concepts that some students find difficult to grasp. For example, thinking in terms of binary numbers and variables, viewing digital design from a systematic approach, combinational and sequential concepts, feedback and memory systems are new or abstract concepts that some students are slow to grasp. The course readings and support lectures are selected to address these concepts; however, many of the students do not read the assigned materials because it is not their preferred approach to acquire knowledge. The laboratory component of the course tries to introduce the students to course concepts from an experimental perspective to address those students whose learning styles prefer a specific teaching style. A considerable number of students also demonstrate boredom or a lack of challenge with the laboratory assignments.

Web 2.0: it expects to provide an outlook of Web 2.0, its services and initiatives, it focuses on the bases on which new Internet services such as Google, e-Bay, Facebook, etc have been built. This is a free choice subject. Figure 2 shows a print screen of the Web 2.0 subject using GlobalPlaza.

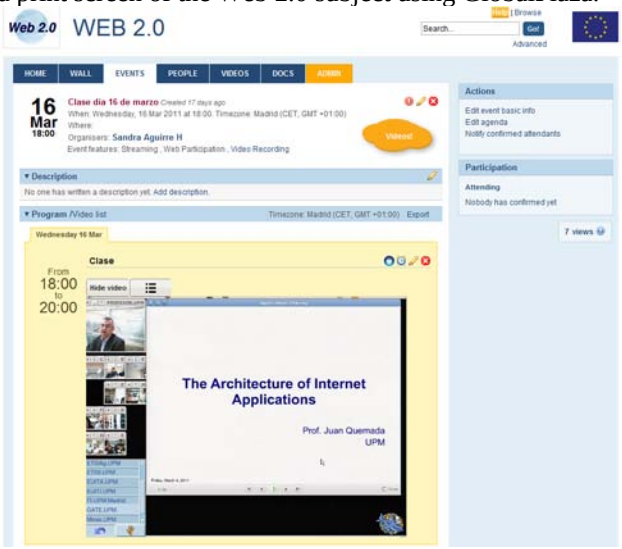

Figure 2. A print screen of the Web 2.0 subject using GlobalPlaza

Structure of Materials 2.0: With significant media attention focused on biotechnology and nanotechnology, material engineering has been propelled to the forefront at many universities in recent years. In Spain the Material Engineering degree is a relatively recent program. The Technical University of Madrid

(UPM) was the first institution to introduce an upper-level degree in the field in 1995. The orientation of the degree was focused on structural materials, from metallurgical engineering. At present, this upper-level degree is taught in another 14 universities across Spain.

The first experience using CyberAula was classroom experiments. The idea of the experiment is related with the processing, structure and properties of the amorphous materials. For the better realization of the experience, the students have formed small groups of two or three people. In this way, this method not only stimulates student´s creativity and autonomous learning but also enhances crucial transversal skills such as team work, communication skills and the promotion of a deep comprehension of scientific methodology in an appealing and more attractive way.

In the long term, the students will have to send a complete report to the teacher (20-30 pages) and make a public presentation of the experiment and the results. The rest of the students must ask and argue with the speaker, since part of their grades will depend on the quality of the question, more than just the answers. These activities will be filmed with the support of the CyberAula 2.0 platform, and will produce a valuable archive of experiments and experience which can be shared and used by other individuals or institutions providing one more small but very important step in the new educational strategies.

Our second experience using CyberAula has been focused in devising and implementing two laboratory experiments on the subject Structure of Materials II, part of the Materials Engineering Degree of the UPM, where the problem of offering more attractive experiments to a larger number of students – two conflicting requirements – has been addressed through "*virtual experiments*". To this end, students are provided with an experiment guide containing some of the theoretical foundations and the experiment procedure together with the key questions that the students should answer in a final report. The students can download a video and a general presentation of the experiment, previously recorded and edited by the teaching staff and generated with the support of the CyberAula 2.0 platform within a certain period of time.

Plants of Agro-alimentary Interest: This is a second-year, free-choice subject, which is currently in the process of expiring with the introduction of the new curricula within the framework of the European Higher Education Space. Students participate in this subject with outstanding interest, thus achieving transversal competences as they must prepare and present a report in the last week of the Semester.

The Project development background was the inclusion of the subject; Plants of Agro-alimentary Interest. It has a quite remarkable, attractive practical appeal within the subjects on offer and is one of the most in demand of the free-choices of the students, whose active participation stands out, either in practical workshops or in their individual presentation of reports. In the workshops they must identify, describe, classify and even taste several species of agro-alimentary interest (fruits from temporal or tropical regions, aromatic plants and spices, edible mushrooms and cereals and pseudo cereals), many of them formerly unknown to the majority of people. They are asked to fill questionnaires in order to consolidate concepts and to evaluate their personal participation in the subject development.

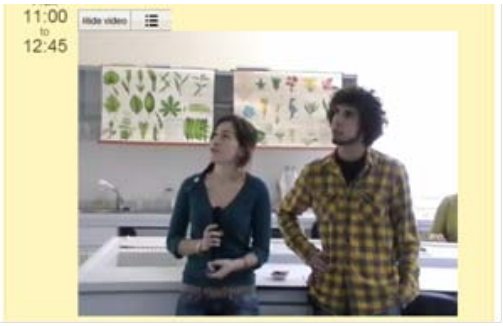

Figure 3. Screen of the subject; Plants of Agro-alimentary Interest

This subject has great chances for the students, because they have the opportunity of passing it through a continuous evaluation system if they attend classes in a participatory way. The corresponding material is previously provided on Moodle. For succeeding in the subject, a significant requirement (meaning 40% of the final mark) is the carrying out and presentation of the aforementioned report, related to a particular agro-alimentary interesting species which was not presented at the classroom lectures. As in all the UPM where this Project was implemented, a specific kit for recording lectures in an assigned classroom was developed.

Conclusions and future work

CyberAula 2.0 is allowing our university to support subjects which need to be promoted or discontinued as part of the Bologna process implementation. The training process for students in the use of the hardware and software was carried out in a short time frame. At the beginning some of the students had problems with the setup of the hardware and software but they can now do it for themselves and they usually require less support from the technical staff.

This approach avoids the limitation on the number of students doing a subject or their physical location. The transition from a passive essential student profile to an active remote student one has been pursued. We are evaluating technical and pedagogical issues of this experience for students and teachers. Surveys on usability and experience with CyberAula 2.0 project are being carried out. The first results indicates that students have identified the project as a very positive progress in their education as a result of the friendly management of Global Plaza Platform and its use for their own benefit taking into account that they have been pioneers in the implementation.

According to the final results, the service of videoconferencing recording will be available as educational resource to the complete staff of our university.

Acknowledgements

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References

Barra, E., Mendo, A., Tapiador, A., & Prieto, D. (2011). Integral solution for web conferencing event management. *Proceedings of the IADIS International Conference e-Society 2011*. Ávila, Spain. 443-446.

Bielawski, L., & Metcalf, D.S (2003). Blended eLearning: Integrating knowledge, performance, support, and online learning. Amherst, MA: HRD Press.

Bologna declaration (1999). *Joint Declaration of the European Ministers of Education*. Bologna.

Council of Europe (2001). Common European Framework of Reference for Languages: Learning, teaching, assessment. Cambridge: C.U.P.

European Credit Transfer and Accumulation System – ECTS. (2009). *European Commission Education & Training*. Retrieved April 06, 2011 from the World Wide Web: http://ec.europa.eu/education/lifelong-learning-policy/doc48_en.htm.

IEEE 1484.12.1-2002 (2002). Standard for Learning Object Metadata.

Quemada, J., De Miguel, T., Pavón, S., Huecas, G., et al. (2005). Isabel: An Application for real time Collaboration with a Flexible Floor Control. *Proceedings of the CollaborateCom 2005*. San Jose, USA.

Sharable Content Object Reference Model - SCORM. (2009). Fourth Edition. *Documentation Suite*.

Shephard, K. (2003). Questioning, promoting and evaluating the use of streaming video to support student learning. *British Journal of Educational Technology*, 34(3). 295-308.